

REPORT

OF

WALTER GWYNN, Esq.

ENGINEER,

TO

THE PRESIDENT AND DIRECTORS

OF THE

PORTSMOUTH AND ROANOKE

RAIL ROAD COMPANY.

NORFOLK :

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1833.

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SUFFOLK, Nov. 18, 1833.

*To the President and Directors of the Portsmouth and
Roosevelt Rail Road Company.*

GENTLEMEN—

I have the honour to submit to you the following report and estimate of the probable cost of your Rail Road:

The ease with which the supposed difficulties in the construction of the road between Portsmouth and Suffolk have been overcome, will dissipate all apprehensions as to the feasibility of the work, and the expediency of the undertaking has been so fully and clearly established by former statements to the company. as to render further comment unnecessary on the present occasion. I shall therefore proceed to the subject immediately before me.

The Line which I have selected as the basis of my estimate, commences at the intersection of the western boundary of Portsmouth and the centre line of High street, and proceeds over an extremely level and unbroken surface to an eligible site for crossing by a bridge, a branch of the Nansemond River, a few hundred yards north of the termination of the Dismal Swamp Land Company's Canal. Thence continuing the line to Suffolk several spring branches are crossed, requiring the construction of small stone drains and some heavy cuttings and fillings. After leaving Suffolk the character of the country changes and becomes somewhat bold—and in order to diminish the quantity of excavation and embankment several undulations in the plane of the Rail Road are unavoidably made—the inclinations are, however, gentle, and the line reaches Blackwater without encountering any other difficulties than an increased expenditure on this portion of it. From Blackwater a level is maintained for some distance, the line passes along the borders of the Swamps which make up to the Highlands, and crossing the Nottoway, on the lands of Mr. Rochelle about seven miles below Jerusalem, it ascends at the rate of 20 feet per mile, passing near Mr. Gurley's to the Cypress Bridge Road. Thence, leaving Vick's Chapel a little to the south and making a slight undulation to avoid some filling, the line arrives at Capt. Barns's Quarter, on the summit of the Ridge dividing the waters of the Nottoway from those of the Meherrin. From Captain Barns's a descent is effected on a grade of 20 feet per mile to Buckhorn Run. Thence the line is continued, on a level, across the Meherrin, about a mile above Branch's Bridge. It then ascends, varying from an inclination of 20 to 12 feet per mile, until the summit of the Rail

James C. Burke
Wilmington, NC
2005

Road is attained, giving an elevation, above the level of tide water, of 144 feet.

Descending from the summit, the Line crosses the Petersburg Rail Road, (on a level with that Road) about two hundred yards south of Capt. Garey's. It afterwards crosses the head of Raccoon Swamp, and terminates on the North bank of the Roanoke River, opposite Weldon. Its direction is S. 70 W., and its length 77 miles, being only a half a mile longer than the distance on a direct line between Portsmouth and Weldon. On reference to the profile, the inclinations and distances will be found as follows:

TABLE OF ASCENTS AND DESCENTS FROM PORTSMOUTH TO THE ROANOKE.

FROM PORTSMOUTH TO SUFFOLK.					FROM SUFFOLK TO THE ROANOKE.				
L'gth of grade.		Inclination in ft per m	Ascent in feet.	Descent in feet.	L'gth of grade.		Inclination in ft per m	Ascent in feet.	Descent in feet.
Miles.	Feet.				Miles	Feet.			
6	1705	0.000	.....	.....	6	1740	00.00	.....	.....
-	4100	15.048	11.685	5.700	7	1040	20.00	143.939	182.500
-	2000				9	660			
-	3175				4	2780			
-	2500	7.920	4.763	.....	2	1990	19.00	86.003	45.161
1	3320	6.864	3.230	.....	2	340	18.000	37.159	.....
-	4500	5.280	8.600	4.500	2	4840	14.000	40.833	.....
-	4100				-	3550	12.00	.....	8.067
-	2500				1	370	11.00	11.770	10.208
-	3400	4.224	3.280	2.000	-	4900			
1	520	3.960	.....	2.550	1	1320	10.00	.....	12.500
-	2000	2.640	2.900	1.000	3	1810	9.00	.....	30.085
-	4900				3	3060	7.00	25.056	.....
1	3520	1.056	.....	1.760	2	840	5.00	10.795	2.746
17 Miles.					-	2900			
					1	120	4.00	4.099	3.545
					-	4680			
					1	520	3.00	3.295	.....
					1	220	2.00	2.008	12.826
					6	2170			
					1	2270	1.00	.....	1.430

59 m. 5160 ft.

From an inspection of the above table, it will be perceived that the greatest inclination does not exceed 20 feet to the mile, and throughout the whole extent of the Road there are but few deviations from a straight line, and these are effected on the arcs of circles whose radii are in no instance less than 5730 feet, and are most generally 11,460 feet in length.

Gentle inclinations and easy curvatures (when it is necessary to vary from a straight line) are points of essential importance in the location of Rail Roads—these desirable objects as well as a line extremely favourable to the advantageous employment of Locomotive Engines are here attained. Indeed, considering the straightness and the moderate

ascents and descents, the performance of an Engine (of given power) will be greater on this, than on any other Rail Road now constructed in the United States. We are therefore enabled to use light Engines, thereby diminishing very considerably the great and leading items in the expense of transportation on Rail Roads, viz: *wear and tear and repairs.*

The engine which it is proposed to use will not exceed five tons weight, and its performance on this Road will be equal to that of a six ton Engine, on a Road with 30 feet grades. From this general view it will be seen, that the face of the country is eminently suitable to the proposed work. The intervening Swamps and the alluvial bottom lands of the Nottoway, Blackwater and Meherrin, offer no serious obstacles.—The bottom is every where composed of solid materials, affording a firm foundation for any embankment or other structure it may be necessary to place on it.

Before proceeding with the estimate I would offer a few remarks in relation to the

CONSTRUCTION OF THE RAIL ROAD.

It will not be necessary on the present occasion to discuss the relative merits of the various modes of construction—and the variety of materials which have been used in the formation of Rail-Ways. Suffice it to say, that the almost universal substitution of wood for stone, and the iron-edge-rail, establishes its preference in the first instance even where stone is abundant and timber scarce. Among the many reasons for this preference of wood, are—its elasticity, its sufficient stability, and its diminution of the *wear and tear* of engines and cars. It follows, then as a necessary consequence, that I recommend for your Rail Road the use of timber which is found in abundance, of excellent quality on almost every part of the line.

The superstructure, then, which I propose to adopt, will be heart pine rails, nine by five inches, plated with iron bars two inches wide, and half an inch thick, resting on white or post oak sills, ten by twelve inches, and eight feet long, placed across the road, five feet apart from centre to centre. The rails will be placed paralld to each other four feet eight and a half inches apart, let into the sills and properly secured by white oak wedges. The sills will be notched for the reception of the rails and wedges and hollowed out in the middle, so as to admit of the construction of a path over them, which will add considerable stiffness to the road, at a very moderate expense—and adapt it to the use of either horse or locomotive power, or both.

Width of Road-Bed. I have estimated for a single rail-way, which for the present will afford sufficient accommodation to the trade and travel. The ditches, however, will be cut and the waste earth disposed with a view to a double track, whenever it may be deemed necessary. The graduated surface of the road-bed in excavations,

will vary from 13 to 16 feet in width, the slopes being 45°. The graded surface on embankments will present a uniform width of 12½ feet, with side slopes of 33½° or 1½ base to 1 perpendicular.

Between Suffolk and Spikes' Run we shall pass several small streams by means of stone drains. The stone for this purpose can be readily obtained at Port Deposites, and the work done now, on as reasonable terms as at any other period. Farther on, wooden structures will be thrown over the water courses, with a span affording sufficient room for the erection hereafter of stone or brick culverts. The bridges across the Blackwater, Nottoway and Meherrin Rivers will be supported by abutments and piers of masonry, the stone for which can be transported by water from Norfolk to their respective sites, and will not at most exceed \$5 per perch (of 25 cubic feet) delivered. On approaching the Roanoke, rock is found tolerably convenient to the line, and will probably be used in crossing the Oconeechee, Troublefield, and Raccoon Swamp.

The difficulties to be overcome having been adverted to, and the plan of the work described, I have next to submit to you the probable

COST OF THE RAIL ROAD.

DIVISION 1ST—From Portsmouth to Suffolk.

The graduation on this division is finished, a portion of the Road has been laid, and nearly all of the timbers delivered. It is contemplated to complete it in the course of the winter, or very early in the spring. On this section of the road, the Dismal Swamp is encountered and successfully crossed—large ditches were dug, which sufficiently drained and furnished materials for the substratum of the road-bed; and this covered with sand to the depth of a foot or more, formed at once a durable and unyielding foundation for the superstructure. Capt. Crozet's estimate of \$90,563, for this portion of the work, will prove more than adequate—the cost will not exceed \$75,000; which will be for

DIVISION I.

From Portsmouth to Suffolk—17 miles,

At \$4411 76 per mile,

\$75,000 00

DIVISION II.

From Main Street, in Suffolk, to Station 290—10 miles.

Excavation—108,923 cubic yards, at 9½ cts. per yard.	\$10,347 68
Embankment—128,213 " " at 10 cts.	12,821 30
Four Stone Drains,	1,000 00
Abutment at Smith's Branch, including Bridge,	4,200 00
Six Truss Bridges,	600 00
One hundred and sixty Tons of Iron, at \$45 per ton,	7,200 00
Six Tons of Spikes, at \$198 per ton,	1,188 00
Splicing Plates, at \$15 per mile,	150 00
105,600 lineal feet of Heart Pine Rails, at \$50 per 1,000 ft.	5,280 00
10,560 Sills, at 50 cts. per Sill,	5,280 00
21,120 Oak Wedges, at 3½ cts. per wedge,	739 20
Carpenters' work, Horse path, &c. \$704 per mile,	7,040 00
Total,	\$55,846 18

DIVISION III.

From Station 290 to Station 525, on the West bank of the Blackwater—9 miles.

Excavation—90,849 cubic yards, at 9 cts. per yard,	\$8,176 41
Embankment—82,358 " " at 10½ cts. "	8,647 59
20 Truss Bridges,	1,500 00
Stone Abutments, Pier and Bridge across Blackwater,	9,500 00
144 Tons of Iron, at \$45 per ton,	6,480 00
Spikes, at \$118 80 per m.	1,069 20
Splicing Plates, at \$15 per mile,	135 00
95,040 lineal feet Heart Pine Rails, at \$47 per 1,000 ft.	4,466 88
9,504 Sills, at 40 cts.	3,801 60
19,008 Wedges, at 3½ cts.	665 28
Carpenters' work, Horse path, &c. at \$704 per mile,	6,336 00
Total,	\$50,777 96

DIVISION IV.

From the Blackwater to Station 672, on the W. bank of the Nottoway—5 miles 2275 feet.

Excavation—12,375 cub. yards, at 9 cents per yard,	\$1,113 75
Embankment—60,735 " " " 10½ " "	6,377 17
Stone abutments, Pier and Bridge over Nottoway,	11,100 00
87 tons Iron \$45 per ton,	3,915 00
Spikes at \$118 80 cents per mile,	645 08
Splicing plates, " \$15 " "	81 45
57,350 lineal feet heart pine Rails \$47 " "	2695 45
5735 Sills, at 37 cents	2121 95
11468 Wedges, 3½ cents	401 38
Carpenters work Horse path, &c. \$704 per mile,	3823 20
Total,	\$32274 43

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DIVISION V.

**From the Nottoway to Cypress Bridge Road—
4 miles 1665 feet.**

Excavation—46931 cubic yards, at 9 cents,	\$4,223 79
Embankment—45202 " " " 10 "	4,520 20
69 tons of Iron, at \$45 per ton,	3,105 00
Spikes, at \$118 80 per mile,	512 02
Splicing plates, at \$15 "	64 65
45,550 Lineal feet heart pine Rails, at \$47 per 1000 feet,	2,140 85
4,555 Sills, at 40 cents,	1,822 00
9110 Wedges, at 3½ "	318 85
Carpenters' work, Horse path, &c. at 704 per mile,	3,034 24
Total,	\$19,741 60

DIVISION VI.

**From Cypress Bridge Road to Buckhorn Run—
9 miles 3000 feet.**

Excavation—96,069 cubic yards, at 9½ cents per yard,	\$9,126 55
Embankment—92,516 " " at 10 " "	9,251 60
153 Tons of Iron, at \$45 per ton,	6,885 00
Spikes, at \$118 80 per M.	1,135 72
Splicing Plates, at \$15 00,	143 40
110,040 Lineal feet Heart Pine Rails, \$47 00 per 1000 ft.	4,748 88
10,104 Sills, at 40 cts.	4,041 60
20,208 Wedges, at 3½ cts.	707 28
Carpenters' Work, Horse-path, &c. at \$704 per mile,	6,730 24
Total,	\$42,770 27

DIVISION VII.

**From Buckhorn Run to Station 1146, on the
W. bank of the Meherrin—4 miles 70 ft.**

Excavation—12,411 cu. yds. at 9 cts.	\$1,116 99
Embankment—46,143 " " " 10 cts.	4,614 30
Stone Abutments, Bridge and Pier across the Meherrin,	14,500 00
Truss Bridge across Buckhorn Run,	120 00
64 Tons of Iron, at \$45 per ton,	2,880 00
Spikes, at \$118 80 per M.	476 73
Splicing Plates, at \$15 00,	60 00
42,380 Lineal feet Heart Pine Rails, at \$47 00 per 1000	1,991 86
4,238 Sills, at 40 cts.	1,695 20
8,476 Wedges " 3½ cts.	296 66
Carpenters' Work, Horse-path, &c. 704 00 per mile,	2,816 00
Total,	\$30,567 74

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DIVISION VIII.

**From the Meherrin to Station 1288—5 miles,
1570 feet.**

Excavation—77,447 cub. yds. at 9 cts.	\$6,970 23
Embankment—113,927 cub. yds. at 10 cts.	11,392 70
Truss Bridges,	500 00
86 Tons of Iron, at \$45 per ton,	3,870 00
Spikes, at \$118 80 per M.	633 60
Splicing Plates, at \$15 00,	80 00
55,940 Lineal ft. Heart Pine Rails, at \$45 00 per 1000 ft.	2,517 30
5,594 Sills, at 0 40 cts.	2,237 60
11,188 Wedges, at 3½ cts.	391 58
Carpenters' Work, Horse-path, &c. at \$704 per mile.	3,754 66
Total,	\$32,347 67

DIVISION IX.

**From Station 1288 to Station 1406, on the
Summit—4 miles, 2450 feet.**

Excavation—67,531 cu. yds. at 9 cts. per yd.	\$6,077 79
Embankment—56,768 " " " 10 " "	5,676 80
71 Tons of Iron, at \$45 per ton,	3,195 00
Spikes, at \$118 80 per M.	529 84
Splicing Plates, at \$15 00,	66 90
47,140 Lineal feet Heart Pine Rails, at \$45 per 1000 ft.	2,121 30
4,714 Sills, at 40 cts.	1,885 60
9,428 Wedges, at 3½	329 98
Carpenters' Work, Horse-path, &c. at \$704 per mile,	3,139 84
Total,	\$23,023 05

DIVISION X.

**From the Summit to the Roanoke—7 miles 4700
feet.**

Excavation—11,460 cubic yards, at 9 cts.	\$9,941 40
Embankment—117,978 " " at 10 "	11,797 80
Truss Bridges and Stone Drains	1100 00
126 Tons of Iron, at \$45 per ton,	5670 00
Spikes, at \$118 80 per mile,	937 33
Splicing plates, at \$15 00 " "	118 35
83320 lineal feet of heart pine Rails, at 45 00 per 1000 feet,	3749 40
8332 Sills, at 40 cents,	3332 80
16664 Wedges at 3½ "	583 24
Carpenters' work, Horse path, &c. \$704 per mile,	5554 66
Total,	\$42,784 88

SUMMARY

Of the Estimates of Excavation, Embankment, Bridges and Superstructure

Division—I.	17 miles		\$75,000 00
" II.	10 "		55846 18
" III.	9 "		50777 96
" IV.	5 "	2275 feet,	32274 43
" V.	4 "	1655 "	19741 60
" VI.	9 "	3000 "	42770 27
" VII.	4 "	70 "	30567 74
" VIII.	5 "	1570 "	32347 67
" IX.	4 "	2450 "	23023 05
" X.	7 "	4700 "	42784 88
	59	5160	\$405,133 78

Add for contingencies, superintendence, land damages, the extension of the Road to the wharves in Portsmouth, Warehouses, Shops, Water Stations, Passing places, &c.

69,866 22

Total amount,

\$475,000 00

The foregoing aggregate amount, it is believed, embraces every item of expenditure that is likely to occur. The increased demand for labour, which may be occasioned by the commencement of the James River and Kanawha Improvement, and other works contemplated in Virginia and in North Carolina, is the only contingency that can affect the cost of this Road. This I have endeavored to provide for, by estimating the amount of work as exhibited on the profile—notwithstanding I am confident that the line is susceptible of modifications, by which the amount of excavation and embankment may be materially lessened, and the grade and direction at the same time, considerably improved.

I am unable, at this time, to form any correct estimate of the Revenue likely to be derived as a return for the capital expended. It may, however, be expected, that I should offer a few general remarks on a subject of so much importance. The direct communication which this Rail-way, in connection with the Chesapeake Bay, and the French Town and New Castle Rail Road, offers between the Northern and Southern cities, the speed, comfort and perfect safety with which passengers can be conveyed through this route, must certainly secure to this Company a considerable Revenue. The favorable point selected for the termination of this Road on the Roanoke—the probable prolongation of a Rail Road from Weldon, Southwardly, by the enterprising citizens of North Carolina—the certainty that to Weldon, as a place of deposite, the heavy and profitable products of that country, and of the valley of the Roanoke, must go—thence, most probably, finding their way on your Rail Road to Norfolk, justify the most sanguine calculations of considerable and lasting revenue to your Company.

The importance of this communication to the whole district of country through which it passes; and especially to Norfolk and Portsmouth, is too well known and appreciated to be dwelt on here.

I have the honor to be, Gentlemen,

Very respectfully, your obedient servant,

WALTER GWYNN, ENGINEER.